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THE GREAT SMOKY MOUNTAINS.

BY JAMES H. FERRISS.

There was a general round-up of the snails in the Smokies last summer. When the roll of diggers was called at Cades Cove, Dr. H. A. Pilsbry answered to his name, and so did Geo. H. Clapp, of Pittsburg, Bryant Walker, of Detroit, Prof. H. A. Sargent, of Ann Arbor, and I did too. Prof. A. G. Wetherby and Mrs. M. L. Andrews intended to be with our party until the very last moment. The year before, I made the trip as far as Mirey Ridge with Mr. Clapp. With this exception it was my first excursion in company with up-to-date scientists. I have made four trips to the Smoky Mountains and expect to go again this year. On two occasions short stops were made at Burnside, Kentucky, on the Cumberland; at Oakdale, Tennessee, on the Emery; Lookout Mountain, at Chattanooga, and a side trip to the Little Tennessee, at Caringer post-office, or Talassee Ford, and one trip was made into the Unaka range. The Smoky Mountains on the north of the Little Tennessee and the Unaka range on the south (not the Unakas near Roan Mountain), form the boundary between Tennessee and North Carolina.

The readers of the NAUTILUS, I am sure, will be pleased to know something of this party. Briefly in ages, its members ran from 35 to 50; at least I am that high, but they are boys still, and can climb more trees and wade streams worse than ever. Mr. Walker, an attorney, and Mr. Clapp, a business man, I think the handsomest members of the party; and their dispositions, their patience, their interest in the comfort of others really approach the domain of the

angels, and when Mr. Blair, our mountain host, was with the party it made three of them. Mr. Clapp can suffer more and complain less than any entirely earthly being. When lame enough to put an ordinary man in a hospital he will sprinkle on a little taicum powder, keep up with the procession and never say a word. Mr. Walker did not sleep the night after our party separated because Sargent and I were out on the mountains without blankets, and the heathen, the two of us, at that very time were as near the happy hunting grounds, both in altitude and spirit, as we may ever be; with a bed of dry moss and a roaring fire at our feet, we slept sweetly as doves, under a massive balsam in the prettiest park I ever saw in the mountains. The next morning we got over 80 *Polygyra Ferrissi* each, and three were albinos.

For industry, zeal and business (shell business), Sargent and Pilsbry are not to be excelled. Sargent always hunts longer and gets more than any other, and Pilsbry, after a hard day's digging, was ready to clean up my catch any time I would bake biscuit. Not one was a believer in ghosts. It was the most sensible, kindly, lovable collection possible. A sad day came when the company separated. Dr. Pilsbry then borrowed soda of a herder and attempted to bake his own biscuit. He did not have any sour milk, and I think that yellow spot remains in the camp site to-day, a wonder to passing herders and a puzzle to those practical mountain scientists who condense their bulky corn crop into convenient form for transportation in jugs.

Cade's Cove, in Blount county, Tennessee, lying at the base of the Smokies, is 1,700 feet above the sea. It is six miles long, in some places two in width, and out of this valley are many other deep coves running up to the top of Boat and Rich mountains, 3,500 feet above the sea. This valley has been searched more than any we have visited. But last year we found four more kinds, and one of those a new variety. The soil is so fertile in shells, like the sea coast of Florida it will be good ground for many years.

With mountain friends, camp dunnage and mules, we left the settlement soon as possible. There was much rain, and the puncheons in the herder's cabin where we slept the first two nights were very hard, but it was a light-hearted company. There were plenty of snails, and school children were never more delighted or delightful. The pleasant days we climbed the mountain sides, when Mr. Pilsbry

and company talked snails, geology, botany and fungi, is a memory will long live pleasantly with your humble author.

Thunderhead is 5,500 feet according to the government maps, and it rains there every week in my experience and it is more storm-swept than many of the higher peaks. The beech trees and buck-eyes are mere scrubs. Blockhouse mountain, of the same height, Coontown, Russell's field and other good coves were hunted over from the first camp. Then we moved along the backbone of the range to Clingman's Dome, some 15 miles farther, passing Briar Knob, the Derricks, Mirey Ridge, Siler's Bald and the Balsam, all over a mile high, and good collecting ground.

Clingman's Dome is 6,600 feet high, covered with balsam fir, and the sphagnum is so deep walking is like tramping on a spring mattress, and very tiresome. When away from a well-beaten trail it is difficult to walk a mile in less than an hour or an hour and a half. Many of the rocks were large as houses, and when we went under for rare shells we carried candles. These feed on the microscopic fungi, I suspect, growing upon the roof, and they seemed to select a roof nearly level. One of the *P. ferrissi* at a time is the rule, but on Andrews Bald, afterwards, we sometimes found as many as eight on one roof. Occasionally *P. clarkii*, *andrewsæ altivaga*, *depilata*, or a *Gastrodonta lamillidens* or *clappii*, would be found on the same roof, but not often.

Bidding the remainder of our party and the mules farewell, as our vacation was longer. Prof. Sargent and I, with a couple of mountain friends, carrying our camp outfit upon our backs, parted company from Pilsbry, Walker and Clapp, and made a trip to Andrews Bald (5,900 feet) from Clingman, though we really started out for Mt. Collins, some 600 feet higher. On Andrews, besides *ferrissi*, we found our finest red *andrewsæ altivaga*, banded with a still darker band. •

The next day we retraced our steps over Clingman and the Balsam to Siler's Bald, where we took the Welsh Bald trail and continued in a southwesterly direction in North Carolina for the next three weeks, with the exception of the two last days. Sometimes we were on the trail all day, while on other days we went only a mile or two. Sometimes we stayed several days in one place. The weather man furnished his best, and only twice were we compelled to build bark shelters to keep us dry.

On Welsh Bald, at an altitude of 5,000 feet, we first found the new variety of *Polygyra edwardsii*, and from a little spring that oozed out from near the top, we found *Pisidium roperi* Sterki. Sargent found this in Minnesota and I had found it in a small pool near Joliet, but the shell is still rare.

We descended to Chambers' Creek one hot afternoon, where it was only 1,500 above the sea. It was a tough slide and both of our mountain friends were sick before starting. From there Sargent made a side trip by rail to Hayesville, N. C., and I first found *Poly. monodon cineta*. And then and afterwards they were mostly dead and found around the basswood and buckeye trees. After a few days' rest, we crossed over to Tuskegee Creek, and in Ramp Cove, on the Tuskegee side of the Yellow Creek Mountains, we first found *Gastrodonta Walkeri* Pilsbry, a new species. It was in company with *significans*. These mountains run up about 4,000 feet, with soil on the slopes rich as a garden.

Passing down Yellow Creek, between the Cheowah and Yellow Creek Mountains, we loaded up with green corn, sweet potatoes and other good things, as the valley is settled. Here we discovered that *Poly. christyi* has a great fondness for the shrub called poison hemlock. The streams were swift and rocky. We found no clams and very few univalves.

At Cheowah river we were down to 1,500 feet again. Hangover and Mount Hayo, in the Unaka range, 5,200 feet, overlook the ford, and the trail we took to these peaks was up a dry pine ridge, steep as the roof of a house, and for the first time in our trip, good drinking water was a little scarce. It took us until 3 o'clock in the afternoon to get up, and all were sore and some were cross.

Every day brought new delights. One afternoon, on Bob Stratton's Bald, 5,400 feet (there is another peak a few miles away called John Stratton's Bald), near Hayo, we found over 200 *G. lamellidens*. We found these in company with *Helicodiscus lineatus*, and *Vitrea carolinensis*, by turning over slabs of stone that lay on top of the ground, and there were sometimes a half a dozen under one stone. The general rule is one *lamellidens* to a dozen or two rocks. The next day, at Glen Cove, a couple of miles lower down the range, we found 130 *Poly. chilhoweensis*. Back on the Little Tennessee river again at Talassee ford, we again found *Gastro. walkerii* at a point less than 1,000 feet above the sea—the lowest point in our trip. One of the

mules and a good walker came to our rescue at Talassee ford and we returned to Cade's Cove, 25 miles in a day. In all we traveled about 150 miles, as measured in a straight line, besides our side trips.

There is much land for the snail hunter here. From the highest peaks we could see mountains 125 miles distant, and it was all mountains as far as we could see in three directions, and over much of this roughness no specimen hunter has traveled.

In the proceedings of the Academy of Sciences of Philadelphia, Dr. Pilsbry has given one of his best reports on the shells of this region. I will, therefore, give merely the list with little more than locality. A number of varieties have been added by Mr. Pilsbry, but not enough.

10. *Helicina occulta* (Say). Rowan Creek in Cade's Cove, $5\frac{1}{2}$ mm., farthest record south.

67. *Poly. pustuloides* (Bld.). Talassee Ford, 2 first trip.

90. *Poly. tridentata* (Say). A double-toothed variety. Rose flats in Cade's Cove, Welsh Bald, Talassee Ford.

91. *Poly. fraudulenta* (Pils.). One only, 13 mm. Welsh Bald, Swain Co., N. C.

96. *Poly. rugeli* (Shuttl.). Everywhere 9 to 15 mm. (Two kinds here sure, the big one is a dirty fellow.)

97. *Poly. inflecta* (Say). Tuckaleeche Cove.

105. *Poly. profunda* (Say). One on Slick Rock Creek in the Unakas in 1898.

106a. *Poly. chilhoweensis* (Lewis). Cade's Cove, Block House, Mirey Ridge, Clingman's Dome, Yellow Creek Mountains, Unakas, Talassee Ford, $27\frac{1}{2}$ to 40 mm.

109. *Poly. albolabris* (Say). Rose Flats in Cade's Cove, Yellow Creek, Cheowah Mountain, 3,400 ft., Cheowah River, Slick Rock Creek (Monroe County, Tenn.). Found in dry situations, dry mountain tops, 32 to 35 mm.

110. *Poly. exoleta* (Binn.). Cade's Cove, Thunderhead, Glen Cove, Talassee Ford.

116. *Poly. ferrissi* (Pils.). Mirey Ridge, Clingman, Andrew's Bald, Welsh Bald. We found only three in two days on Welsh Bald, but got 160 in half a day on Andrew's. I offered to exchange a dozen of these shells with a dealer at the rate of \$6 per dozen. After we had been in Ferrissi territory a couple of days my expert brethren held a council of war and called me down. They said the price

should certainly be high as a dollar each. The next day they raised it to \$3 and before we parted they said, taking the rarity and beauty of the shell and the difficulties of finding it all into consideration, the price should be \$5 and railroad fare paid to the spot. Our experience at Andrews would tend to lower this price, but Andrews is 25 miles from civilization, the miles are wild ones, and whoever starts out to hunt *ferrissi* on speculation, I still believe will earn his money.

118. *Poly. palliata* (Say). Cade's Cove, Russell Field, Chamber's Creek, Tuskegee Creek, Slick Rock Creek, Talassee Ford.

119d. *Poly. appressa perigrapta* (Pils.) all along the route.

121. *Poly. clarki* (Lea). General in deep coves but sparingly, 18mm.

123a. *Poly. andrewsæ normalis* n. var. (Pils.). Mr. Pilsbry has added two varieties to *andrewsæ* and some day there may be others. Those on Thunderhead (*altivaga*) approached the small, thin, greenish, smoky type, but many are banded. They measure 22 to 24 diameter. The types I have from Roan Mountain are 20 to 23. *Normalis* finds its way to the lower altitudes, 1,000 ft., and apparently thrives as well as upon Mirey Ridge or Bobs Bald, and it is quite generally distributed—Cade's, Welsh Bald, Chamber's Creek, Tuskegee, Yellow Creek, Slick Rock, Citico Creek and Talassee Ford. It has been white or russet colored so far, and the largest with the highest spires were found on Mirey Ridge at an elevation of 4,500 and on Citico Creek at 3,000. The largest measures 40 mm. diameter, 25 altitude (Citico), 38½ diameter, 24 altitude (Mirey). Usually 31 to 35 diameter, occasionally with a small tooth on parietal wall. Sociable and active. The best traveler in the range.

123b. *Poly. andrewsæ altivaga* (Pils.). n. var. Thunderhead, Mirey Ridge, Clingman's Dome, Andrew's Bald. We did not find this after leaving this range, and it was always at the mountain top or the nearest basswood and buckeye belt, under stones or moss. On Mirey Ridge only, it occupies the same territory with *normalis*, but not often found in the grass or in the open. Unless further divided its colors are white, greenish or smoky white, cherry red, and both colors sometimes banded with a darker red band as in *profunda*. Sometimes there is an additional line at the suture and some are half and half, dark above and light below. (Mirey, N. C. side.) 22 to

25 diam. Largest red colored forms were found on Andrews but our stay was short and we found but few. This variety is more often toothed than normalis. In some localities 43 per cent. had teeth on the parietal wall. About $\frac{1}{2}$ are banded. On one slope of Mirey Ridge all were white, upon another all half and half, and upon another a fourth were red, the others white and banded. Upon Clingman and Andrews the choice "rediiis" were the most common. This variety furnishes the most entertainment and has caused more shouting and singing and expressions of joy and perplexity of any in the Smokies.

124. *Poly. thyroides* (Say). Welsh Bald, Chamber's Creek, Talassee Ford.

125. *Poly. clausa* (Say). Talassee Ford.

126. *Poly. wheatleyi* (Bld). All along the route in very damp situations.

This is the most variable shell of this region. At Cade's the measurements were 16 to 18 mm. diam. All dentate, all hirsute, large flaring lip and a few were albinos. The same measurements prevailed at Block House. On Clingman they dropped back to 13 and 14 diam. and some were not toothed or hirsute and quite globose, with narrow lip. At Welsh Bald we found part of both. At Tuskegee and Cheowah all were small and only partially dentate or hirsute. Ascending Mt. Hayo, we again found the 13 mm. variety up the sides and at the top. Two miles further we found on Bobs Bald a large variety I first supposed to be *ferrissii*. It was not hirsute but deeply sculptured and 2 or 3 were dentate. 23 mm. On our return to Cade's in Brannon's Cove, we again found the small globose form, the smallest being only 12 mm.

127. *Poly. christyi* (Bld.). Cade's Cove, Tuskegee Creek, Cheowah river, in flat ground near streams.

136a. *Poly. edwardsi magnifumosa* (Pils.). n. var. Welsh Bald, Chambers' Creek, Tuskegee Creek, Mt. Hayo, Glen Cove. Mr. Sargent also found this at Hayesville, N. C.

138. *Poly. stenotrema* (Fer.). Cade's, Welsh Creek and south of Little Tennessee. At Chambers' Creek south side of Little Tennessee and at Talassee Ford we found it measuring 13 mm.

138b. *Poly. depilata* (Pils.). Cade's, Thunderhead, Mirey Ridge, Clingman, Andrew's Bald and Bobs Bald. Under moss and stones.

139a. *Poly. hirsuta pilula* (Pils.). n. var. Cade's Cove and

Thunderhead only. Do not remember of ever finding the typical *hirsuta* in these mountains.

141c. *Poly. monodon cincta* (Lewis). Tuskegee Creek, Yellow Creek, Mt. Hayo, Glen Cove, Talassee Ford.

180a. *Strobilops labyrinthica strebeli* (Pfr.). Cade's Cove, Yellow Creek Mountains.

187. *Bifidaria contracta* (Say). Cade's Cove.

194. *Bifidaria corticaria* (Say). Cade's Cove.

225. *Vertigo gouldii* (Bid.). Cade's Cove.

226. *Vertigo bollesiana* (Morse). Cade's Cove. These four species very rare.

235. *Cochlicopa lubrica* (Mull). Sugar Cove in Cade's. One specimen by Sargent.

239. *Circinaria concava* (Say). General. Largest $23\frac{1}{2}$ diam.

246a. *Omphalina fuliginosa polita* (Pils.). Cade's Cove, Coontown, Chambers' Creek, Talassee Ford. At the two last named places on the Little Tennessee the shells were as light colored as the typical *fuliginosa*, but polished. There were no black forms at these points.

248. *Omphalina laevigata* (Pfr.). Cade's Cove, Cheowah river. Only a few found at the latter place and these were dark colored and as well polished nearly as *Omp. Andrewsæ*. Largest 20 mm. diam., 12 altitude.

248a. *Omp. laevigata perlævis* (Pils.). n. var. Talassee Ford.

248b. *Omphalina laevigata luvior* (Pils.). n. var. This variety has given me trouble since I saw it on my first trip to Tennessee. It is much larger than type, much depressed and a light "Melantho" blue in color. As I read shell music by ear, it has very little resemblance to the typical form. The largest from Talassee Ford measured 28 diam., 10 altitude. Also found at Chambers' Creek.

250. *Omphalina subplana* (Binn). All along the route in damp moss. On the Unakes the shells were very fragile, sometimes the shell was a mere membrane but large and healthy otherwise. It is as much of a cannibal as *concava*. Largest (Mt. Hayo) 24 diam., 10 altitude.

252. *Omphalina andrewsæ* (Pils.). All along the route. In Cade's Cove there is a light colored form, faintly banded with darker color. Largest 18 mm. in diam. 16 is large.

252a. *Omp. Andrewsæ montivaga* (Pils.). Cade's Cove, Mirey

Ridge, Welsh Bald, Mt. Hayo. Largest $20\frac{1}{2}$ greatest diam., 16 smallest diam.

253. *Vitrinizonites latissimus* (Lewis). Cade's Cove, Block House, Thunderhead, Mirey Ridge, Siler's Bald, Balsam, Clingman, Andrew's Bald, Welsh Bald, Mt. Hayo, moss and stones.

253a. *Vitrinizonites latissimus uvidermis* (Pils.). n. var. Thunderhead, Mirey Ridge, Clingman's Dome. These two often associate with the above, but not always. It is more active in its habits. The elastic shell is so thin our specimens collapsed, and in fact the shell is worn indented and crushed in by its rightful owner. It is darker and larger than the type. The largest are 19 greatest diam.

263a. *Vitrea petrophila pentadelphica* (Pils.). n. var. Named after the five of us. At Cade's Cove, Cheowah River and Bob's Bald; found by mining.

270. *Vitrea indentata* (Say). Cade's Cove. Greatest diam. 5 mm.

271. *Vit. sculptilis* (Bld.). At nearly all points high or low, but never abundant. It is one of the most beautiful of mountain shells, being a warm pink in color, but from improper handling, perhaps, this beautiful tint fades away. Largest 10 diam. Binney reports $12\frac{1}{2}$.

272. *Vit. carolinensis* (Ckll.). Generally distributed along the route, under rocks; a brigadier indentatus. Largest $8\frac{1}{2}$, found by Mr. Clapp on Mirey Ridge.

274. *Vit. capsella* (Gld). Cade's Cove, Chambers' Creek.

276. *Vit. capsella placentula* (Shuttl.). Cade's Cove.

278. *Conulus chersinus* (Say). Cade's Cove, 3 in 1898.

283. *Zonitoides arboreus* (Say). As far as Tuskegee river and again at Talassee Ford.

287. *Z. patuloides* (Pils.). Cade's Cove, very sparingly.

295. *Gastrodenta intertexta* (Binn.). Cade's Cove, Mirey Ridge, Welsh Bald, Chambers' Creek, Yellow Creek Mts., Talassee Ford. Largest 17 diam. Never plentiful, fond of poison hemlock; sometimes albino as all these mountain shells seem to be.

296. *Gastro. acerra* (Lewis). One of the common kind all along the road. It shows much variation without change of locality. My largest is 18 diam., $10\frac{1}{2}$ alt. Another of only 17 diam. is $13\frac{1}{2}$ in alt.

297. *Gastro. demissa* (Binn.). Cade's Cove.

301. *Gastro. gularis* (Say). Common on the route.

302. *Gastro. suppressa* (Say). Brannan's Cove and Chestnut Flats in Cade's Cove, Chambers' Creek.

305. *Gastro. elliotti* (Redf.). General but not plentiful.

306. *Gastro. interna* (Say). Welsh Bald and south of Little Tennessee, plentiful.

307. *Gastro. significans* (Bld). Cade's Cove, Yellow Creek Mts.

309. *Gastro. multidentata* (Binn.). Talassee Ford, found one first trip.

310. *Gastro. lamellidens* (Pils.). Thunderhead Block House, Coontown, Mirey Ridge, Clingman, Cheowah River, Bobs Bald. 4 mm.

310-1. *Gastro. Clappi* (Pils.) Thunderhead, Block House, Mirey Ridge, Clingman.

310-2. *Gastro. Walkeri* (Pils.). n. sp. Cheowah river, Yellow Creek Mts., Talassee Ford. Diam. 29, altitude 1.45.

The last five belong to the Taxeodonta group; the other member, *andrewsæ*, is found at Roan Mt., about 75 miles east of Clingman.

338. *Pyramidula alternata* (Say). Andrew's Bald, Chambers' Creek, Yellow Cr. Mts., Yellow Creek and Unaka range; depressed and small. 18 mm. At Cade's two were found of the Knoxville type, large, whorls round and epidermis crinkled. 25 mm.

338b. *Pyr. alternata costata* (Lewis). Cade's Cove and Thunderhead only. 20 mm.

342. *Pyr. perspectiva* (Say). Common, large and toothed. 10 mm.

346. *Helicodiscus lineatus*, Cade's Cove, Mirey Ridge, Tuskegee Mts., Bob's Bald.

347. *Helicodiscus fimbriatus* (Weth.). Talassee ford, two first trip.

348. *Punctum Blandianum* (Pils.). n. sp. Found by Mr. Clapp, in 1898, on a tulip tree stump at Brannan's in Cade's Cove. These stumps beginning to decay, make fine feeding ground for little fellows.

362. *Succinea obliqua* (Say). On the very top of Thunderhead, Mirey Ridge and Clingman.

Goniobasis saffordi (Lea). Chambers' Creek.

Goniobasis proxima (Say). Welsh Bald branch. Tuskegee Creek.

Pleurocera trivittatum (Lea). Talassee Ford.

Pisidium roperi (Sterki). Welsh Bald.

Between Knoxville and Cade's Cove, 35 miles, the following are found, *Poly. elevata*, form *cineta*, Taylor; *Poly. spinosa* (Lea); *Omphalina kopnodes* (W. G. Bin.); *Gastrodonta macilenta* (Shuttl.) and *Pyr. Bryant* (Harper).

A NEW PHILOMYCUS.

BY T. D. A. COCKERELL.

Philomycus secretus n. sp.

Length (in alcohol) 12 mm. Mantle very dark grey, with numerous small black spots, best seen at the sides. Body pallid, sole whitish with an ochreous tint.

Jaw light yellow, arched, with five strong ribs in the middle, nearly the outer thirds being ribless. Teeth 9-11-13-1-13-11-9. The side cusps on both centrals and laterals are very small. Penis-sac as Binney describes for *P. hemphilli*.

Hab.—Roan Mtn., Mitchell Co., North Carolina. (A. G. Wetherby.)

Mr. Wetherby sent me two specimens with these remarks: "A small slug found here which I am quite sure has never been described. It is never larger than these specimens; lives deep down in drifts of damp leaves, and never comes to the surface so far as my careful observation of it for the last ten years goes to show. It is "sluggish" in its habits; about all it will do when brought to the light is to cautiously protrude its very short tentacles." (Litt., March 22, 1899.)

By its jaw characters, this resembles only *P. hemphilli*. From that, as described by Binney, it differs mainly in being only half the size. Mr. Wetherby knows both species, and states that the present animal is uniformly small; further, although I was not able to make a satisfactory examination of the anatomy, the genital organs appear to be fully developed.

ON SOME JAPANESE LAND SNAILS.

BY H. A. PILSBRY.

In a former paper on Japanese snails, I identified a species of *Euclota* from Ushika, prov. Teshio, with the *Helix læta* of Gould, but